



Mitigating the health impacts of pollution from oceangoing shipping: An assessment of low-sulfur fuel mandates

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Abstract:

Concerns about health effects due to emissions from ships have magnified international policy debate regarding low-sulfur fuel mandates for marine fuel. Policy discussions center on setting sulfur content levels and the geographic specification of low-sulfur fuel use. We quantify changes in premature mortality due to emissions from ships under several sulfur emissions control scenarios. We compare a 2012 No Control scenario (assuming 2.7% or 27 000 ppm S) with three emissions control scenarios. Two control scenarios represent cases where marine fuel is limited to 0.5% S (5000 ppm) and 0.1% S (1000 ppm) content, respectively, within 200 nautical miles of coastal areas. The third control scenario represents a global limit of 0.5% S. We apply the global climate model ECHAM5/MESSy1-MADE to geospatial emissions inventories to determine worldwide concentrations of particular matter (PM_{2.5}) from oceangoing vessels. Using those PM_{2.5} concentrations in cardiopulmonary and lung cancer concentration-risk functions and population models, we estimate annual premature mortality. Without control, our central estimate is approximately 87 000 premature deaths annually in 2012. Coastal area control scenarios reduce premature deaths by ~ 33 500 for the 0.5% case and ~ 43 500 for the 0.1% case. Where fuel sulfur content is reduced globally to 0.5% S, premature deaths are reduced by ~ 41 200. These results provide important support that global health benefits are associated with low-sulfur marine fuels, and allow for relative comparison of the benefits of alternative control strategies. © 2009 American Chemical Society.

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Resource Description

Communication:

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience:

audience to whom the resource is directed

Policymaker



Climate Change and Human Health Literature Portal

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution

Air Pollution: Particulate Matter

Geographic Feature:

resource focuses on specific type of geography

Ocean/Coastal

Geographic Location:

resource focuses on specific location

Global or Unspecified

Health Co-Benefit/Co-Harm (Adaption/Mitigation):

specification of beneficial or harmful impacts to health resulting from efforts to reduce or cope with greenhouse gases

A focus of content

Health Impact:

specification of health effect or disease related to climate change exposure

Injury, Respiratory Effect

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation, Mitigation

Model/Methodology:

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type:

format or standard characteristic of resource

Policy/Opinion

Timescale:

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content

